

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Currently Amended) An apparatus comprising:

a first processor to execute a main thread instruction stream that includes a delinquent instruction, wherein the first processor is to be associated with a first private cache;

a second processor to execute a helper thread instruction stream that includes a subset of the main thread instruction stream, wherein the subset includes the delinquent instruction, and wherein the second processor is to be associated with a second private cache;

~~wherein said first and second processors each include a private data cache;~~

a shared memory system coupled to said first processor and to said second processor; and

control logic to push ~~retrieve~~, responsive to a miss of requested data for the delinquent instruction in the second private cache associated with ~~[[of]]~~ the second processor, the requested data ~~from the shared memory system; the logic further to provide the requested data to the~~ first private ~~data-cache~~ associated with ~~of~~ the first processor.

2. (Currently Amended) The apparatus of claim 1, wherein: the first processor, second processor and logic are included within a chip package, and wherein the shared memory system includes a shared cache.

3. (Currently Amended) The apparatus of claim 1, further comprising retrieval logic coupled to the control logic to retrieve the requested data from the shared memory system in response to the miss of the requested data for the delinquent instruction in the second private cache. ~~wherein: the shared memory system includes a shared cache.~~
4. (Currently Amended) The apparatus of claim 3, wherein: the control logic to push, responsive to a miss of requested data for the delinquent instruction in the second private cache, the requested data to the first private data cache of the first processor comprises the control logic, responsive to the miss of the requested data and the retrieval logic retrieving the requested data, to broadcast the requested data to an affinity group of processors including at least the first processor. ~~the shared memory system includes a second shared cache.~~
5. (Currently Amended) The apparatus of claim 3, wherein: the control logic to push, responsive to a miss of requested data for the delinquent instruction in the second private cache, the requested data to the first private data cache of the first processor comprises the control logic, responsive to the miss of the requested data and the retrieval logic retrieving the requested data, to unicast the requested data to the first processor. ~~the shared cache is included within a chip package.~~

6. (Currently Amended) The apparatus of claim 1, wherein: the control logic is further to provide the requested data from the shared memory system to the second private data cache associated with ~~of~~ the second processor.
7. (Currently Amended) A processor comprising: The apparatus of claim 1,
~~wherein: said first and second processors are included in a plurality of n~~
~~processors, where $n > 2$; each of said plurality of processors is coupled to the~~
~~shared memory system; and each of said n plurality of processors includes a~~
~~private data cache.~~
a first processor core to be associated with a first private cache and to execute a
first thread;
a second processor core to be associated with a second private cache and to
execute a second speculative thread, the second speculative thread to
include a load instruction from the first thread that a miss to the first
private cache is anticipated during execution of the first thread; and
logic to retrieve data for the load instruction from a higher level memory and to
provide the data to the first private cache associated with the first processor
core in response to a miss to the second private cache responsive to
execution of the load instruction in the second speculative thread with the
second processor core.

8. (Currently Amended) The processor apparatus of claim 7, wherein: the logic to retrieve data for the load instruction from a higher level memory and to provide the data to the first private cache comprises in response to a miss to the second private cache responsive to execution of the load instruction in the second speculative thread with the second processor core comprises the logic to
retrieve the data in response to the miss to the second private cache responsive to execution of the load instruction in the second speculative thread with the second processor, and
broadcast the data to private caches associated with an affinity group of processor cores, the affinity group of processor cores including at least the first processor core. ~~is further to provide the requested data from the shared memory system to each of the n private data caches.~~

9. (Currently Amended) The processor apparatus of claim 7, wherein: the logic to retrieve data for the load instruction from a higher level memory and to provide the data to the first private cache comprises in response to a miss to the second private cache responsive to execution of the load instruction in the second speculative thread with the second processor core comprises the logic to
retrieve the data in response to the miss to the second private cache
responsive to execution of the load instruction in the second
speculative thread with the second processor, and
unicast the data to the first private cache associated with the first private
core, the logic is further to provide the requested data from the
shared memory system to a subset of the n private data caches, the
subset including x of the n private data caches, where $0 < x < n$.
10. (Currently Amended) The processor apparatus of claim 7 [[1]], wherein: the
higher-level memory includes a memory coupled external to the processor, and
wherein the first processor core is further to trigger the second processor core's
execution of the second speculative thread helper thread instruction stream
responsive to execution of a trigger instruction in the first main thread with the
first processor core instruction stream.

11. (Currently Amended) An apparatus comprising:
- a first processor to execute a main thread instruction stream that includes a delinquent load instruction, wherein the first processor is to be associated with a first data cache;
 - a second processor to execute a helper thread instruction stream that includes a subset of the main thread instruction stream, wherein the subset includes the delinquent load instruction, and wherein the second processor is to be associated with a second data cache;
 - ~~wherein said first and second processors each include a private data cache; and~~
 - retrieval logic to retrieve, responsive to a miss of requested data for the delinquent load instruction in a first one of the second private data cache[[s]], the requested data;
 - and
 - control logic to provide the requested data to the first data cache associated with the first processor in response to the retrieval logic retrieving the requested data and without a request from the first processor.
 - ~~from the other private data cache if said requested data is available in the other private data cache;~~
 - ~~the logic further to provide the requested data to the first private data cache.~~

12. (Currently Amended) The apparatus of claim 11, further comprising: a third processor and a shared memory system coupled to said first processor, and to said second processor, and said third processor; ~~said logic is further to retrieve the requested data from the shared memory system if the requested data is not available in the other private data cache.~~
13. (Currently Amended) The apparatus of claim 12 ~~[[11]]~~, wherein: retrieval logic to retrieve, responsive to a miss of requested data for the delinquent load instruction in the second data cache, the requested data comprises:
the retrieval logic, responsive to the miss of requested data for the delinquent load instruction in the second data cache, to issue a snoop for the requested data to a third data cache associated with the third processor, and
the third data cache to provide the requested data to the retrieval logic in response to receiving the snoop issued from the retrieval logic. ~~the logic is included within an interconnect, wherein the interconnect is to provide networking logic for communication among the first processor, the second processor, and the shared memory system.~~

14. (original) The apparatus of claim 13, wherein: the retrieval logic to retrieve, responsive to a miss of requested data for the delinquent load instruction in the second data cache, the requested data further comprises:
- the retrieval logic, responsive to the miss of requested data for the delinquent load instruction in the second data cache, to request the requested data from the shared memory system concurrently with issuing the snoop to the third data cache; and
- the retrieval logic to receive the requested data from the shared memory system in response to a miss of the requested data in the third data cache.
- ~~the first and second processor are each included in a plurality of n processors; and the interconnect is further to concurrently broadcast a request for the requested data to each of the n processors and to the shared memory system.~~
15. (Currently Amended) The apparatus of claim 12 ~~[[11]]~~, wherein: the first, second, and third processors each include a processor core on a single package, and wherein the shared memory system includes a shared higher-level cache.

16. (Cancelled)
17. (Original) The apparatus of claim 11, wherein: the first processor is further to trigger the second processor's execution of the helper thread instruction stream responsive to a trigger instruction in the main thread instruction stream

18. (Currently Amended) A method comprising:

executing a main thread including a load instruction with a first core, the first core associated with a first private cache;

determining that a helper core has suffered a missing in a second private cache associated with a second core in response to executing the for a load instruction within a helper thread with the second core while executing a helper thread; and

prefetching load data for the load instruction into the first [[a]] private cache of a main core responsive to missing the second private cache in response to executing the load instruction within the helper thread with the second core.

19. (Currently Amended) The method of claim 18, wherein prefetching the load data for the load instruction into the first private cache further comprises:

retrieving the load data from a shared memory system; and

broadcasting the load data to an affinity group of cores including at least the first core in response to retrieving the load data from the shared memory system.

providing the load data to the private cache of the main core.

20. (Currently Amended) The method of claim 18, further comprising:

providing the load data for the load instruction from a shared memory system into the second private cache associated with the second ~~of the helper~~ core.

21. (Currently Amended) The method of claim 18, further comprising:
providing the load data for the load instruction from a shared memory system into a ~~the~~
private cache for each of a plurality of helper cores including the second core.
22. (Currently Amended) The method of claim 18, wherein prefetching the load data
for the load instruction into the first private cache further comprises:
retrieving the load data from a third private cache associated with ~~of~~ a third ~~helper~~ core;
and
providing the load data to the private cache associated with ~~[[of]]~~ the first ~~main~~ core in
response to retrieving the load data from a third private cache.
23. (Currently Amended) The method of claim 18, wherein prefetching the load data
for the load instruction into the first private cache further comprises: concurrently:
broadcasting a request for the load data to each of a plurality of cores; and
requesting the load data from a shared memory system.

24. (Currently Amended) The method of claim 23, wherein prefetching the load data for the load instruction into the first private cache further comprises:

providing, if the load data is available in a private cache of one of the plurality of cores, the load data to the main core from the private cache of one of the plurality of cores ; and

providing, if the load data is not available in a private cache of one of the plurality of cores, the load data to the main core from the shared memory system.

25. (Currently Amended) An article comprising:

a machine-readable storage medium having a plurality of machine accessible instructions, which if executed by a machine, cause the machine to perform operations comprising:

determining that a helper core has suffered a miss in a helper private cache for a load instruction from a main thread executing on a main core while executing a helper thread; and

~~prefetching~~ fetching load data for the load instruction in response to determining the helper core has suffered the miss in the helper private cache for the load instruction; and

pushing, unsolicited from the main core, the load data into a main private cache of the
~~a~~ main core in response to fetching the load data for the load instruction.

26. (Currently Amended) The article of claim 25, wherein: fetching load data for the load instruction in response to determining the helper core has suffered the miss in the helper private cache for the load instruction comprises: the instructions that cause the machine to prefetch load data further comprise instructions that cause the machine to retrieve the load data from a shared memory system in response to determining the helper core has suffered the miss in the helper private cache for the load instruction; and wherein pushing, unsolicited from the main core, the load data into a main private cache of the main core in response to fetching the load data for the load instruction comprises: provide broadcasting the load data to an affinity group of private caches of an affinity group of cores including the main private cache of the main core. to the private cache of the main core.

27. (Currently Amended) The article of claim 25, : fetching load data for the load instruction in response to determining the helper core has suffered the miss in the helper private cache for the load instruction comprises: retrieving the load data from a shared memory system in response to determining the helper core has suffered the miss in the helper private cache for the load instruction; and wherein pushing, unsolicited from the main core, the load data into a main private cache of the main core in response to fetching the load data for the load instruction comprises: unicasting the load data to the main private cache of the main core.~~further comprising: a plurality of machine accessible instructions, which if executed by a machine, cause the machine to perform operations comprising: providing load data for the load instruction from a shared memory system into the private cache of the helper core.~~
28. (Currently Amended) The article of claim 25, further comprising: a plurality of machine accessible instructions, which if executed by a machine, cause the machine to perform operations comprising: providing load data for the load instruction from a shared memory system into the private cache for each of a plurality of helper cores including the helper private cache of the helper core.

29. (Currently Amended) The article of claim 25, wherein: fetching load data for the load instruction in response to determining the helper core has suffered the miss in the helper private cache for the load instruction comprises: the instructions that cause the machine to prefetch load data further comprise instructions that cause the machine to: retrieving[[e]] the load data from an additional helper private cache of an additional helper core; ~~and provide the load data to the private cache of the main core.~~

30. (Cancelled):

31. (Cancelled)

32. (Currently Amended) A system comprising:

a memory system ~~that includes a dynamic random access memory;~~

a first processor, coupled to the memory system, to execute a first instruction stream;

a second processor, coupled to the memory system, to concurrently execute a second instruction stream; and

helper threading logic to push provide fill data to a first private cache of the first processor, the fill data to be prefetched by the second processor and to be pushed to the first private cache before a request for the fill data is issued by the first processor. ~~to the first processor.~~

33. (Cancelled)
34. (Currently Amended) The system of claim 32, wherein: the helper threading logic is further to push ~~provide~~ the fill data to the first private cache of the first processor from a second private cache of the second processor.
35. (Currently Amended) The system of claim 32, wherein: the helper threading logic is further to push ~~provide~~ the fill data to the first private cache of the first processor from the memory system.
36. (Currently Amended) The system of claim 32, wherein the first processor and the second processor are each processor cores, and wherein the first processor core, the second processor core, and the helper threading logic are included in a single processor package coupled to the memory system. ~~further comprising: an interconnect that manages communication between the first and second processors.~~
37. (Currently Amended) The system of claim 36 ~~[[32]]~~, wherein: the memory system includes a cache that is shared by the first and second processor cores coupled to a dynamic random access memory.